State of Illinois
Department of Registration and Education
STATE GEOLOGICAL SURVEY DIVISION
John C. Frye, Chief

GUIDE LEAFLET

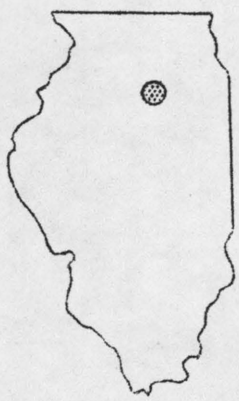
GEOLOGICAL SCIENCE FIELD TRIP

Sponsored by
ILLINOIS STATE GEOLOGICAL SURVEY, URBANA

MARSEILLES-OTTAWA AREA

LaSalle County

Marseilles and Ottawa Quadrangles



Leader
George M. Wilson
Urbana, Illinois
September 15, 1956

GUIDE LEAFLET 1956D

HOST: Marseilles High School

MARSEILLES GEOLOGICAL SCIENCE FIELD TRIP

Itinerary

0.0	0.0	Cars face north in front of Marseilles High School.
0.6	0.6	Turn left and proceed to stop street. Turn right.
0.2	0.8	Proceed north on Main to stop light. Proceed ahead.
0.0	0.8	The outcrop on the left is the Vermillionville Sandstone (Pennsylvanian) of northern Illinois, called the Cuba Sandstone in western Illinois, and the Absher in southern Illinois. This sandstone overlies the No. 5 Coal which is extensively mined in western and southern Illinois.

The Vermillionville Sandstone is a channel-fill type of sand, and at many places the lower portion of the sand contains a conglomerate with large, irregular shale fragments similar to the shale in the walls of the channel. As we climb the hill to the upland, we encounter the morainic topography of the Marseilles Moraine. (For discussion of glaciation see pages 7 and 11.)

The glacial deposits that we will observe today were deposited during the last two glacial ages, the Illinoian and the Wisconsinan. There were two earlier glacial ages, the Kansan and the Nebraskan. The first was the Nebraskan. The moraine that we are crossing is called the Marseilles. It is one of the largest and highest of the moraines in Illinois. In this area it has a width of more than four miles and is easily 100 to 160 feet above the lake plains which surround it. The moraine is crossed by two deep channels that served as outlets for glacial Lake Wauponsee.

2.8	3.6	As we cross a portion of the moraine, we drop into an old sub-glacial channel, and as we turn left, note how thick the black soil is above the yellow sub-soil.
0.9	4.5	Stop 1. Soil profile and discussion of soil formation.

The soil here is derived from the weathering of glacial materials. The soil in the Marseilles area generally averages 3-4 feet in thickness, but here it is only a few inches thick.

Like many other things, rocks and minerals undergo changes when they are exposed to the weather. Although these changes are relatively slow, they become evident in earth deposits that are not disturbed over long periods of time, resulting in what is known as a weathering or soil profile on the surface.

Following the practice established about 30 years ago by the Russian, Glinka, soil scientists usually consider that the soil or weathering profile consists of 3 zones, designated A, B, and C from the top down. The A zone is the "topsoil" zone, which is normally black or gray in color. The B zone is the "subsoil" zone, and the C zone is the unaltered parent material.

The zonal effect is due to the four principal processes which affect soil weathering, each progressing downward with the movement of groundwater, but at different rates. These processes, listed according to their rate of progress, beginning with the most rapid, are (1) oxidation, (2) leaching of carbonates, (3) decomposition of more resistant minerals, and (4) accumulation of humus.

Consequently, in the shallow A zone, in which the humus material derived from decaying plants has accumulated, the rock minerals are oxidized, leached, and decomposed. In the upper part of the B zone they are oxidized and leached, and in the lower part of the B zone they are only oxidized. The oxidation zone is shown by the reddish or yellowish color resulting from the oxidation of iron minerals. The leached zone is determined by the absence of carbonates, as revealed by tests with a solution of hydrochloric acid.

Ahead of us (west) at an elevation of approximately 640 feet, we find evidence of the highest stage of glacial Lake Ottawa. The lake plains were formed during the culmination of the Valparaiso advance, at the time of the Kankakee Torrent, when the waters were ponded behind the Cropsey, Farm Ridge, and Marseilles Moraines. At this time the Kankakee, Du Page, and Des Plaines Rivers were receiving the meltwaters from the ice in Michigan, Indiana, and northeastern Illinois. The streams overflowed onto the flat upland between the moraines, where they deposited their load of silts and clay, and deposited some gravel in channels.

The glacial lakes formed in this area at the time of the Kankakee Torrent were Lake Ottawa in front of the Marseilles Moraine, Lake Wauponsee behind the Marseilles Moraine, Lake Pontiac southwest of the Marseilles Moraine, and Lake Watseka south of Marseilles Moraine. As the volume of water decreased, the waters became confined to the river valleys in which erosion continued actively, although they were receiving deposits of sand and gravel. The lowest erosional level of the Kankakee Torrent is called the Buffalo Rock Terrace at an elevation of about 540 feet.

0.5	5.0	At this point one can see the gentle slope of the front of the Marseilles Moraine and look out across the old Lake Ottawa Plain.
2.9	7.9	Proceed to stop sign. Turn right.
3.6	11.5	Along this road we are traveling on the shoreline of old Lake Ottawa. SLOW. CAUTION. Turn left.
2.6	14.1	Follow winding gravel road. SLOW.
0.1	14.2	Cross Fox River. Turn right and stop. Wedron Silica Company.
1.0	15.2	Stop 2. Trip through the silica sand quarry of the Wedron Silica Company. CAUTION. RAILROAD CROSSING.

This sand quarry is of special interest because of the wealth of interesting material that has been found here. The operation here is in the St. Peter Sandstone, which is exposed by stripping away the overburden of glacial drift.

The St. Peter Sandstone is quarried, broken down and pumped to the mill, where the sand is washed, sized, dried, and sacked for various uses. The deep channel in the sandstone is a pre-Wisconsinan channel, formed during the Sangamonian Age.

0.1 15.3 Cross Fox River.

2.6 17.9 Follow winding gravel road and return to Route 71. STOP.

4.2 22.1 Turn right on Route 71. At elevation 570 we will be on the level of the Buffalo Rock Terrace.

0.8 22.9 Stop 3. Clay pit of the LaClede-Christy Firebrick Company. CAUTION. Be careful crossing Route 71.

Here we see a stripping operation in which the glacial drift, shale, and coal are removed in order to reach the underclay which is refractory and is used in the manufacture of refractory brick. This brick resists high heat without deformation or melting. The coal is also recovered and used locally.

The section here is as follows:

	Thickness Ft.	In.
Pleistocene Series		
Wisconsinan Stage		
Soils	2	0
Glacial drift	3	0
Pennsylvanian System		
Liverpool Cyclothem		
Francis Creek Shale, gray, well laminated	15	0
Colchester No. 2 Coal	1	7
Underclay, fireclay, kaolinitic	6-7	

0.1 23.0 Return to cars. CAUTION. Junction with Route 6. Continue ahead on Route 6.

0.9 23.9 Note the LaClede-Christy Fire Brick Company on the left.

0.6 24.5 Note the abandoned strip pits on the right and left as you cross Fox River.

0.7 25.2 CAUTION. Stop. Intersection of Routes 23, 71, and U. S. 6. Proceed on U. S. 6.

1.2 26.4 Proceed through city. SLOW. CAUTION. Turn left.

1.0	27.4	CAUTION. CROSSING RAILROAD TRACKS. Note the large silica plants on the right and the deep excavations that have been made in the St. Peter Sandstone.
		STOP. Turn right. Note the large Libbey-Owens-Ford plant on the left.
		Entering Naplate. SLOW.
0.7	28.1	Stop in Naplate. Proceed. CAUTION. RAILROAD TRACKS.
0.7	28.8	A large abandoned silica mill on the left.
0.7	29.5	Bear left at the intersection.
0.4	29.9	The sized and graded gravel is obtained from the river flat just to the south by means of suction dredges.
0.1	30.0	SLOW. CAUTION. Entering Buffalo Rock State Park. Speed limit 10 miles per hour.

As we travel along note the fluted sandstone on the right. The rushing currents at the time of Lake Chicago cut into the rock and produced this effect.

0.5 30.5 Stop 4. Lunch in the grounds of Buffalo Rock State Park. Discussion of the features seen in the morning and specifically the relationships of the Pennsylvanian rocks to the underlying Ordovician rocks.

Here, as well as at the LaClede-Christy pit, we find that there was a considerable time lapse between the deposition of the Ordovician and Pennsylvanian rocks. The section exposed in the bluff is described below:

	Thickness Ft.	In.
Pennsylvanian System		
Shale, gray, well laminated	20	
Coal No. 2	1	6
Underclay, brown, sandy		2
Sandstone, gray, carbonaceous, much reworked St. Peter Sandstone.		
Ordovician System		
St. Peter Sandstone, gray to yellow, buff, massive, crossbedded	100	

Here there is virtually no underclay between the coal and the underlying sandstone, but a clay pit was formerly operated only a few hundred yards away. As the rocks dip to the west the interval between No. 2 Coal and the St. Peter increases.

0.5	31.0	Leave park. SLOW as we approach the exit. Turn left.
0.7	31.7	Note abandoned crude silica plant on left, as well as abandoned coal and fireclay stripping operations on the right and left.

0.4 32.1 CAUTION. Cross railroad track. Turn left. Stop 5.

Entering crude silica sand pit in St. Peter Sandstone. The St. Peter here varies from the other sand only in that the sand has been stained by limonite derived from the weathering of the overlying sediments. Crude sand and foundry sand are produced from this pit. Of considerable interest to the geologist is the occasional clay pocket that occurs in the St. Peter Sandstone. These clay pockets appear to be widened joints that developed during the long erosional interval. When the early Pennsylvanian rocks were deposited in this region, the clay filled the open joints.

1.7 33.8 Follow pit road back to graveled highway. Turn right. Follow road. SLOW. Entrance to Buffalo Rock State Park.

0.5 34.3 Proceed ahead. CAUTION. Intersection from left.

0.5 34.8 Stop 6. Terrace developed by the flood waters of glacial Lake Chicago.

The level of the terrace coincides with the groove developed in the base of the cliff at Buffalo Rock. It was during this time that Buffalo Rock was isolated by erosion of the flood waters.

Notice the fossiliferous limestone in the spoil on this terrace surface. One might postulate that this limestone, which in part caps the terrace in this area, may have been a controlling factor in preserving this terrace. After the overflow from glacial Lake Chicago had cut the terrace and the lake was slowly declining, the Illinois River entrenched itself in its present channel.

0.4 35.2 Entering Naplate.

0.1 35.3 STOP. Proceed.

1.0 36.3 Turn left.

0.1 36.4 Turn right.

0.4 36.8 STOP. Proceed ahead.

0.1 36.9 Stop light. Turn right.

0.1 37.0 North side of bridge over Illinois River.

0.6 37.6 Cross bridge. STOP. Follow Route 23. Turn right.

0.3 37.9 Follow street. Turn left.

0.3 38.2 Follow street. Turn right.

0.1 38.3 Turn left.

0.3 38.6 Turn right.

0.5 39.1 Stop 7. Gravel deposit in Lake Illinois. Farm Ridge Sub-stage.

These deposits were in large part overlain by the Marseilles deposits, but in the region south of Ottawa, lying beneath the Ottawa terrace, are gravel deposits of Lake Illinois age. These deposits largely occur in steep-sided channels in glacial drift or bedrock. Note that in this deposit the gravel is cross-bedded in repeated sequences. The section is as follows:

	Thickness Ft.	In.
Humus, silty	1	
Silt, brown, noncalcareous	2	
Farm Ridge drift, Lake Illinois Delta		
Gravel, fine, cross-bedded	10	
Silt, brownish-gray, calcareous	1-2	
Gravel, fine, poorly sorted, cross-bedded	10	

0.3 39.4 CAUTION. Railroad crossing.

0.3 39.7 STOP. CAUTION. Turn left. Entering Route 71.

0.8 40.5 SLOW. Turn left leaving Route 71. Note the abandoned mines in the No. 2 Coal on the left.

0.2 40.7 SLOW. Cross Covel Creek. Note the Ordovician Platteville Limestone in the banks of the creek.

0.3 41.0 Note the Cuba-Vermillionville Sandstone on the right. This sandstone overlies the position of the No. 5 Coal.

1.6 42.6 Turn left.

0.5 43.1 Turn right.

0.1 43.2 Turn left.

1.6 44.8 Turn left. We are on the Lake Ottawa Plain.

1.0 45.8 Note the terrace level developed in Covel Creek.

0.1 45.9 Stop 8. St. David and Summun Cyclothems.
The section here is as follows:

	Thickness Ft.	In.
Pennsylvanian System		
St. David Cyclothem		
Shale, well laminated	20	
Shale, black, sheety, position of No. 5A Coal		5
Shale, gray, fine, thinly laminated, with many ironstone concretions		
Shale, dark, fine, carbonaceous, rather fossiliferous	1	
Shale, black, sheety, hard, with many impressions of Dunbarella in lower 2 inches	1-2	

	Thickness Ft.	In.
Shale, calcareous, very fossiliferous, pyritic		6
Shale, dark gray, fine, thinly laminated and weak, with an occasional black, hard, calcareous concretion		8
Shale, medium gray, fine, thinly laminated	2	
Summum Cyclothem		
Limestone, cone-in-cone structure		1-2
Limestone, blue-gray, dense, hard, conglomeratic in lower part (Covel Conglomerate - type section)		3-10
Underclay, medium-dark gray, medium coarse	4	
Limestone, medium gray, a coquina of small marine fossils, especially ostracods and brachiopods with a conglomerate band in lower few inches	1	
Concretion bank, tends to be nodular, hard, dense		0-10
Clay shale, fine, greenish-gray	2	
Black shale, coaly		1
Underclay, light gray		6

Note that in neither of the cyclothems is the coal developed, yet only a few miles away the No. 5 Coal is extensively mined, as in the Peoria region.

0.8 46.7 Return to cars. Follow road to intersection with Route 23. Turn left to go to Ottawa. Turn right to go to Streator.

End of Field Trip

Glacial History

The Marseilles area has a wealth of Pleistocene geology. There are moraines, sub-glacial channels, kames, eskers, and terraces, all within a relatively restricted area. These deposits have been studied and reported on in Bulletin 66, "Geology and Mineral Resources of the Marseilles, Ottawa and Streator Quadrangles" by H. B. Willman and J. Norman Payne (out of print).

Thousands of years ago much of northern North America was covered by huge glaciers. These glaciers, which advanced from centers in eastern and central Canada, developed when the mean annual temperatures were a few degrees lower than they are now, and the winter snows did not completely melt during the summers. After many years a sheet of ice accumulated that was so thick its weight caused it to flow outward, carrying with it the soil and rocks on which it rested and over which it moved.

The Pleistocene Epoch or "Great Ice Age" began about one million years ago and ended about five thousand years ago. During this epoch, there were four major ages of glaciation, each followed by a long interglacial age characterized by climatic conditions much as they are today.

The oldest glacial age is the Nebraskan, named after the state of Nebraska where extensive Nebraskan deposits are buried beneath the younger glacial deposits. In Illinois the Nebraskan deposits are also buried. A warm climatic interval, called the Aftonian (interglacial) Age, followed the retreat of the Nebraskan glacier.

The next glacial climate produced the Kansan glacier which left thick deposits of fine rock materials and outwash sand and gravel in Illinois when it melted away. The Kansan Age was followed by the Yarmouthian (interglacial) Age. During this age erosion carved valleys and hills, and soils were formed in the Kansan deposits.

The third glacial age, the Illinoian, is particularly important to the residents of Illinois. It covered 80 percent of the state, reaching southward to Carbondale and Harrisburg. After several thousand years, a warm age caused the Illinoian ice sheet to melt. During this warm age, the Sangamonian, the upper part of the deposits left by the glacier was weathered and soils developed, as in the preceding Yarmouthian interval. These ancient Sangamonian soils resemble present-day soils in color, texture, and depth, suggesting that the climate during interglacial times was similar to our present climate.

The last and most recent glacial age in Illinois was the Wisconsinan, which began about 70,000 years ago. The Wisconsinan comprised three major glacial advances--the Altonian, the Woodfordian, and the Valderan. Little is known about the extent of the Altonian glacier, as its deposits were overridden by later glaciers, except in northern Illinois. The Woodfordian glacier advanced southward from the Lake Michigan basin to the present sites of Shelbyville, Decatur, Charleston, and Peoria. The Valderan glacier reached its maximum extent near Milwaukee, Wisconsin, and did not enter Illinois.

When the glaciers melted, they released the rock materials they had picked up as they advanced. These materials are called "glacial drift." Some of the glacial drift was washed out with the meltwaters. The coarsest material carried by the meltwater was deposited nearest the ice front, and the finer material was carried farther away, with the finest clay possible carried all the way to the ocean. Where the outwash material was spread widely along the front of the glacier, it formed an outwash plain. Where the outwash was restricted to the stream valleys, it formed valley train deposits.

Glacial drift deposited directly by the ice is called till. It consists of a mixture of all kinds and sizes of rock fragments. As the Wisconsinan glacier retreated, the ice withdrawals and readvances created a complex sequence of till deposits in northeastern Illinois, the most outstanding of which are end moraines. More than 50 successive end moraines were formed by the Wisconsinan glacier in Illinois alone. The major ones are shown on the accompanying glacial map of Northeastern Illinois.

An end moraine is an accumulation of drift at the ice margin when the rate of advance and the rate of melting of a glacier are essentially in balance. As more and more rock debris is brought to the edge of the glacier, it piles up and forms a ridge.

The surface relief of end moraines is generally greater than that of the surrounding area and is referred to as swell-and-swale or knob-and-kettle topography. At some places there are large gaps in the moraines where subglacial streams presumably carried away most of the drift. The flatter areas behind end moraines are called ground moraines or till plains.

As a glacier began to recede, meltwater accumulated in local ponds between the ice front and the moraine last formed, except where there were channels through the moraine through which the pond could drain. Where such drainage channels are absent, it may be presumed that as the ice-front continued to recede, the local ponds gradually merged into one large lake that persisted until the retreating glacier uncovered some outlet, or until some river eroded a channel of sufficient depth to drain the pond.

At times, especially in the fall and winter, the meltwaters subsided, exposing the valley trains. The wind picked up silt and fine sand from the floodplains and dropped them on the bluffs and uplands to form deposits of <u>loess</u>. Loess mantles most of Illinois. Near the large river valleys it may be as much as 60 to 80 feet thick. It thins away from the valleys.

The importance of the Pleistocene Epoch is emphasized by the rich soils formed from the glacial deposits and by the abundant deposits of sand and gravel. The state would not have these valuable resources if the glaciers had not invaded Illinois.

Geologic History of the Marseilles-Ottawa Area

The bedrock exposed in the Marseilles-Ottawa area is of Ordovician and Pennsylvanian ages. Below these strata lies a considerable thickness of lower Ordovician and Cambrian sediments composed of sandstone, dolomite, shale, and limestone. Little is known about these older rocks, which can be studied only from samples obtained in deep wells. Even less in known about the Precambrian basement complex.

Let us turn our attention to the rocks of Paleozoic age, especially those in the immediate area. With the development of the La Salle Anticline, only a short distance to the west, the rocks on the east and gentle flank were eroded away; that is to say, those of late Ordovician, Silurian, Devonian and Mississippian ages. The principal deformation along the La Salle Anticline and the area to the east occurred after Mississippian time and during early Pennsylvanian time, allowing the erosion and removal of approximately 1700 feet of limestone, sandstone, and shale. Thus the first sedimentary rocks formed during the Pennsylvanian in this area are in the Liverpool Cyclothem.

In the areas east and west of this arch the Pennsylvanian rocks were deposited on rocks of late Ordovician, Silurian, Devonian and Mississippian ages. There is a major erosion surface between the Pennsylvanian above and the (St. Peter) lower Ordovician. After Pennsylvanian time there was again further deformation along the La Salle anticlinal axis.

In the Marseilles area the oldest exposed rocks belong to the lower Ordovician Series. The St. Peter Sandstone is a remarkably pure quartz sandstone thought to be of marine origin, having been deposited in a shallow sea. In the Minneapolis area this sandstone occasionally contains marine fossils.

The overlying Platteville Limestone fills channels that have been cut into the St. Peter Sandstone.

For the most part, where the Pennsylvanian sediments can be seen in contact with the Ordovician in this area, the first identifiable Pennsylvanian rocks are in the Liverpool Cyclothem.

During the Pennsylvanian Period the Marseilles region was low-lying, and the sediments were deposited in rather shallow seas. It is logical to assume that, under such an environment, there would be a rather wide range of sediments, laterally as well as vertically in the sequence. Many of the rocks are observed to be repeated in similar sequences.

While an ideally complete cycle of deposition is seldom demonstrated, the sequence beginning at the base is as follows: (1) sandstone or siltstone, (2) sandy shale, (3) limestone, (4) underclay, (5) coal, (6) gray shale, (7) limestone, (8) black shale, (9) limestone, and (10) gray shale. (See attached sheet.)

OUTLINE OF THE PHYSIOGRAPHIC AND GLACIAL HISTORY of the MARSEILLES-OTTAWA AREA

by H. B. Willman

(Based largely on studies by M. M. Leighton, George E. Ekblaw, Leland Horberg, and H. B. Willman)

PLIOCENE EPOCH	Development of the Central Illinois peneplain with a relatively flat surface across the La Salle Anticline.
	Deposition of chert gravel in channels, as near Ottawa.
PLIOCENE and/or PLEISTOCENE EPOCHS	Dissection of the peneplain leaving a north-south divide on the La Salle Limestone on the west slope of the La Salle Anticline. Drainage west from the divide to the Ancient Mississippi River, which then was flowing east from the Rock Island region to the present course of Illinois Valley below the "big bend" at Bureau. Drainage east to a south-flowing river near Morris.
PLEISTOCENE EPOCH	
Nebraskan Age	Invasion of western Illinois by an ice sheet from the Keewatin center. Weathering in the La Salle area.
Aftonian Age	Weathering in the La Salle area. Formation of Afton Soil.
Kansan Age	La Salle area covered by an ice sheet moving southwestward from the Labradorean Center. Diversion of east-flowing streams westward across the La Salle Anticline and erosion of Ticona Valley, a few miles south of the present Illinois Valley, to a depth of over 200 feet.
Yarmouthian Age	Deep weathering and erosion of Kansan drift. Formation of Yarmouth Soil. Drainage along Ticona Valley, to the Ancient Mississippi Valley.
Illinoian Age	La Salle area again covered by ice from the Labradorean center and the earlier drift eroded, except along the valleys. Major valleys not completely filled with drift, so that on retreat of the ice, rivers were re-established in the Ancient Mississippi and Ticona Valleys.
Sangamonian Age	Deep weathering of Illinoian drift. Formation of Sangamon Soil. Local accumulation of peat and alluvium.
Wisconsinan Age	
Altonian Sub-age	Deposition of loess from a valley-train along Ancient Mississippi Valley, followed by a short interval of weathering (Farmdalian Sub-age).

Woodfordian Sub-age	Valley-train along the Ancient Mississippi Valley from the Keewatin ice sheet which crossed Iowa to the Mississippi Valley. Deposition of loess in the La Salle area.
	Ice advanced from Labradorean center, crossed the La Salle area and deposited the Shelbyville Moraine. Mississippi River diverted westward to the present channel. On retreat of the Shelbyville glacier, the Ancient Mississippi Valley was blocked at Peoria by the Shelbyville Moraine forming Lake Kickapoo, which extended up Ticona Valley into the La Salle area.
	Repeated readvance and retreat of the ice, building several moraines behind the Shelbyville Moraine in east central Illinois, filling Ticona Valley, and leaving the lowest drainage channel at the present position of Illinois Valley.
	Readvance of the ice and deposition of the Bloomington-Normal Moraines, again blocking drainage at Peoria and forming Lake Illinois at an elevation of 600 feet.
	Building of deltas in Lake Illinois by melt-waters from the retreating ice front.
	Repeated readvance and retreat of the ice-front, depositing consecutively the Cropsey Moraines west of La Salle and the Farm Ridge and Marseilles Moraines east of La Salle. Deltas formed in Lake Illinois.
	Retreat of the ice front from the Marseilles Moraine. Fox Valley Torrent eroded the dam of Lake Illinois at Peoria and drained the lake.
	Readvance of the ice and deposition of the Minooka, Rockdale, and Valparaiso Moraines.
	The Kankakee Torrent, at the beginning of Valparaiso retreat, discharged a larger volume of water into Illinois Valley than the valley could carry, and the water spread widely over the uplands, forming lakes between the moraines at a maximum elevation of about 650 feet. Upland surfaces were channeled and benches were eroded, especially where the waters were concentrated through the moraines, as north of Split Rock.
	Declining waters of the Kankakee Torrent eroded channels as low as 540 feet, the top of Buffalo Rock and Starved Rock.
	Readvance of the ice and deposition of the Tinley Moraine behind the Valparaiso. On retreat of the ice-front, Lake Chicago was formed between the ice and the moraine. Outlet along Des Plaines and Illinois Valleys.
	Overflow from Lake Chicago (Outlet River) eroded Illinois Valley to the level of the Ottawa Terrace, the rock bench which covers all the valley floor at Ottawa except the narrow channel occupied by Illinois River. Tributary valleys were left hanging, resulting in development of canyons, as in Starved Rock Park.

Twocreekan Sub-age — During the late stages of Lake Chicago channels were eroded in the Ottawa Terrace and coarse gravel, consisting largely of Niagaran dolomite from the Chicago region, was left in the channels, as near Buffalo Rock.

Outlet River covered the valley from bluff to bluff, and a small falls or cascade half a mile east of Buffalo Rock was retreating headward when the Chicago outlet was abandoned.

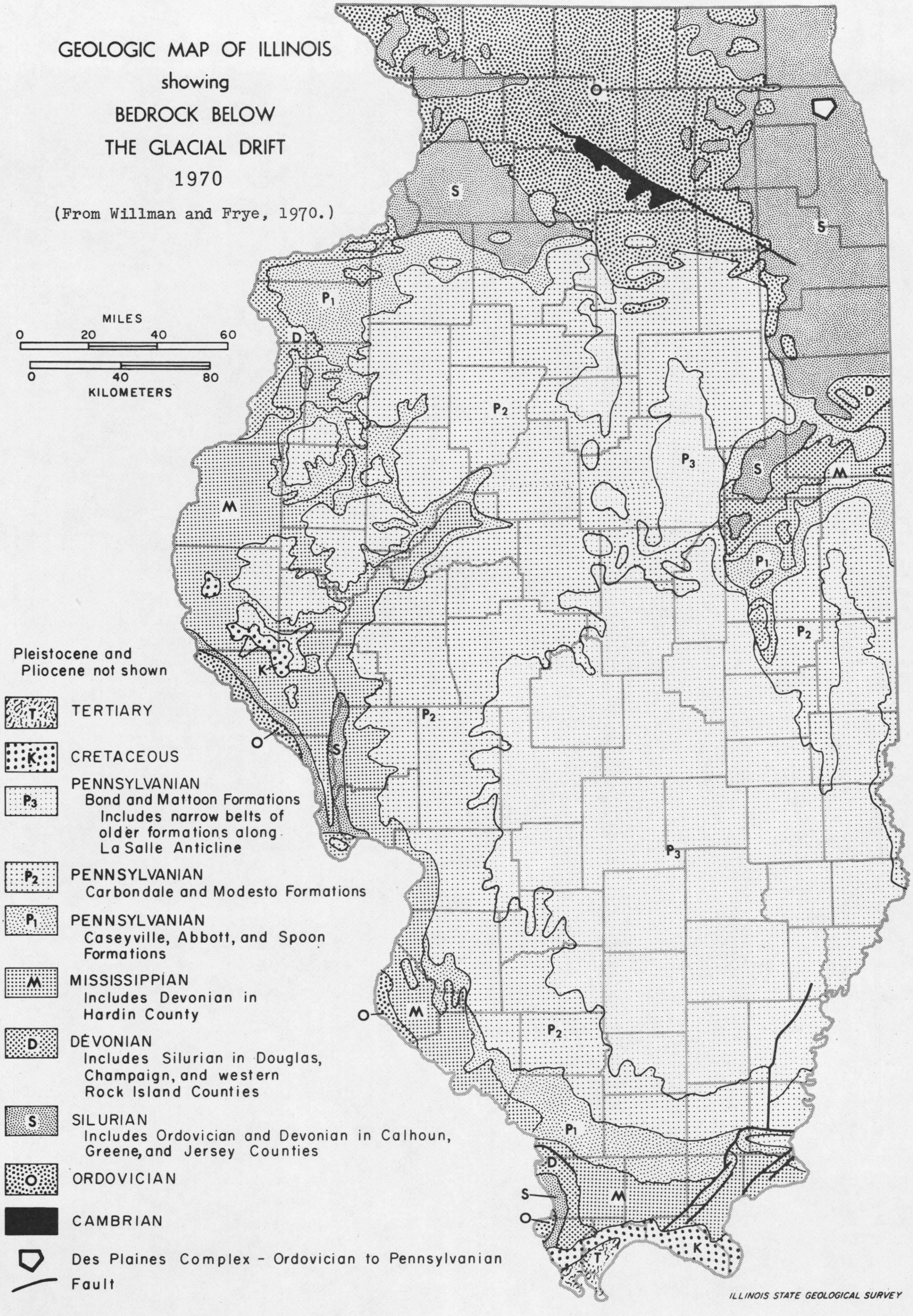
The declining waters of Lake Chicago eroded only a narrow channel in the Ottawa Terrace east of Utica where the terrace is underlain by St. Peter Sandstone and the Shakopee and Platteville Dolomites. Farther west the relatively soft Pennsylvanian rocks were easily eroded, and only remnants of the terrace remain. Recent alluvium covers the entire valley floor.

(For further details and references see Illinois Geological Survey Bulletin 66, pp. 140-180, 204-230.)

Revised and Reprinted, Nov. 1965

GENERAL GEOLOGIC COLUMN FOR THE MARSEILLES-OTTAWA AREA

ERA	SYSTEM	SERIES	GROUP OR STAGE	FORMATION	REMARKS
CENOZOIC	Quaternary	Pleistocene	Wisconsinan Illinoian Kansan		Till, gravel, sand, silt, clay, loess
CENOZOIC	Tertiary				Conglomerate and sandstone
PALEOZOIC	Penn.		McLeansboro Kewanee McCormick		Sandstone, shale, clay, limestone, coal
PALEOZOIC	Miss.				Shale, brown
PALEOZOIC	Dev.				Limestone, light gray
PALEOZOIC	Silurian	Niagaran		Port Byron Racine Waukesha Joliet	Dolomite, some limestone
PALEOZOIC	Silurian	Alexandrian		Kankakee Edgewood	Dolomite and sandstone
PALEOZOIC	Ordovician	Cincinnatian	Maquoketa		Shale, some dolomite or limestone
PALEOZOIC	Ordovician	Champlainian	Galena		Dolomite and limestone, light brown
PALEOZOIC	Ordovician	Champlainian	Platteville		Dolomite and limestone
PALEOZOIC	Ordovician	Champlainian	Ancell	Glenwood	Sandstone, shale, dolomite
PALEOZOIC	Ordovician	Champlainian	Ancell	St. Peter	Sandstone, some conglomerate at base
PALEOZOIC	Ordovician	Canadian	Prairie du Chien	Shakopee	Dolomite with some thin sandstones
PALEOZOIC	Ordovician	Canadian	Prairie du Chien	New Richmond	Sandstone and some dolomite
PALEOZOIC	Ordovician	Canadian	Prairie du Chien	Oneota	Dolomite, cherty
PALEOZOIC	Cambrian	Croixan	Trempealeauan	Jordan	Dolomite, sandstone, and shale
PALEOZOIC	Cambrian	Croixan	Trempealeauan	Potosi	Dolomite
PALEOZOIC	Cambrian	Croixan	Franconian	Franconia	Sandstone, dolomite, shale, very glauconitic
PALEOZOIC	Cambrian	Croixan	Dresbachian	Galesville	Sandstone with some dolomite
PALEOZOIC	Cambrian	Croixan	Dresbachian	Eau Claire	Sandstone, shale, and dolomite
PALEOZOIC	Cambrian	Croixan	Dresbachian	Mt. Simon	Sandstone, arkosic at base, some shale, and conglomerate
Precambrian					Igneous and metamorphic rocks


GEOLOGIC MAP OF ILLINOIS
showing
BEDROCK BELOW
THE GLACIAL DRIFT
1970
(From Willman and Frye, 1970.)
MILES
0 20 40 60
0 40 80
KILOMETERS
Pleistocene and Pliocene not shown
T TERTIARY
K CRETACEOUS
P3 PENNSYLVANIAN
Bond and Mattoon Formations
Includes narrow belts of older formations along La Salle Anticline
P2 PENNSYLVANIAN
Carbondale and Modesto Formations
P1 PENNSYLVANIAN
Caseyville, Abbott, and Spoon Formations
M MISSISSIPPIAN
Includes Devonian in Hardin County
D DEVONIAN
Includes Silurian in Douglas, Champaign, and western Rock Island Counties
S SILURIAN
Includes Ordovician and Devonian in Calhoun, Greene, and Jersey Counties
O ORDOVICIAN
CAMBRIAN
Des Plaines Complex - Ordovician to Pennsylvanian
Fault
ILLINOIS STATE GEOLOGICAL SURVEY

10 Shale, gray, sandy at top; contains marine fossils and ironstone concretions, especially in lower part.

9 Limestone; contains marine fossils.

8 Shale, black, hard, laminated; contains large spheroidal concretions and marine fossils.

7 Limestone; contains marine fossils.

6 Shale, gray; pyritic nodules and ironstone concretions common at base; plant fossils locally common at base; marine fossils rare.

5 Coal; locally contains clay or shale partings.

4 Underclay, mostly medium to light gray but dark gray at top; upper part noncalcareous, lower part calcareous.

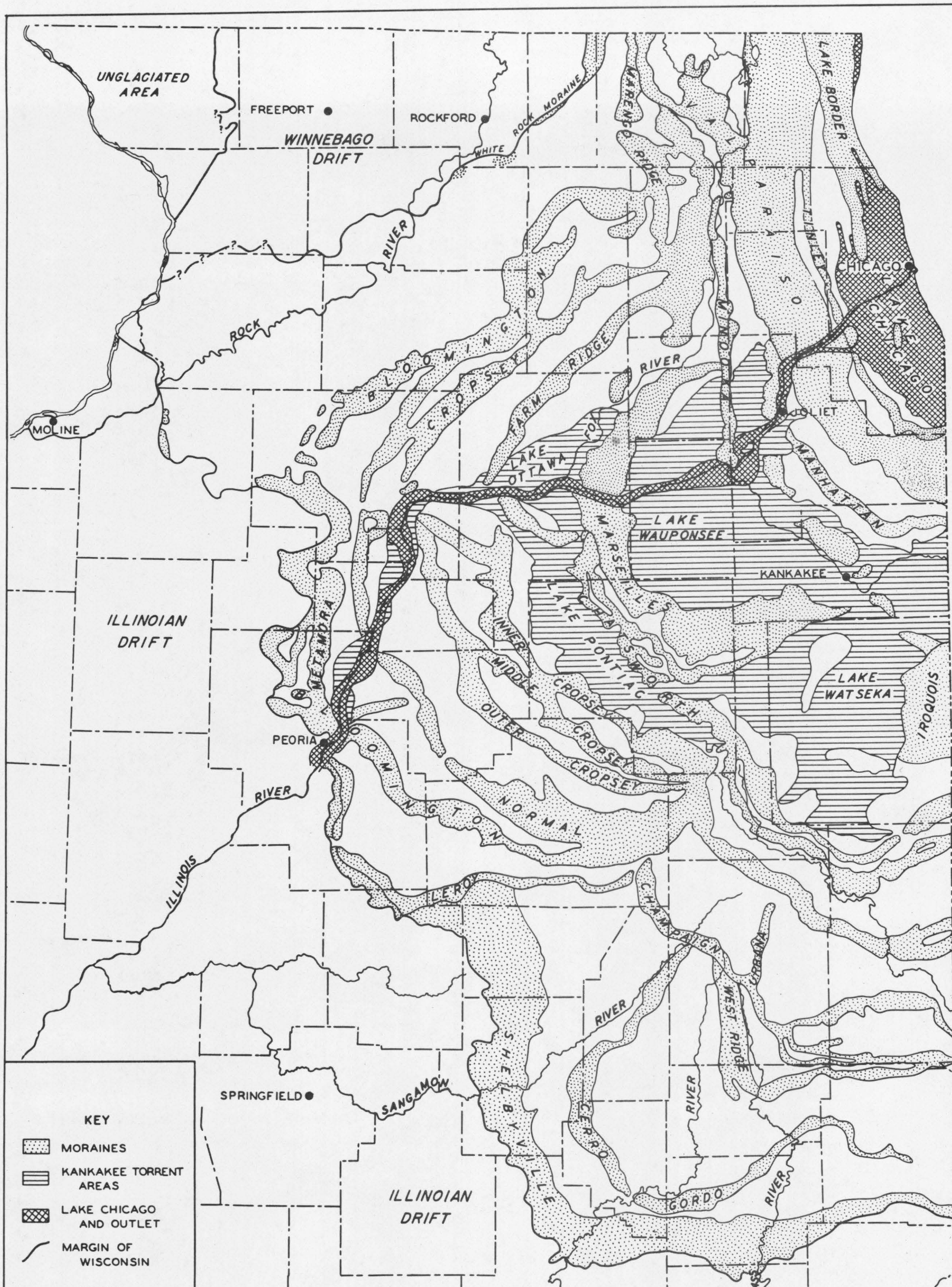
3 Limestone, argillaceous; occurs in nodules or discontinuous beds; usually nonfossiliferous.

2 Shale, gray, sandy.

1 Sandstone, fine grained, micaceous, and siltstone, argillaceous; varies from massive to thin bedded; usually has an uneven lower surface.

AN IDEALLY COMPLETE CYCLOTHEM

(Reprinted from Fig. 42, Bulletin No. 66, Geology and Mineral Resources of the Marseilles, Ottawa, and Streator Quadrangles, by H. B. Willman and J. Norman Payne)

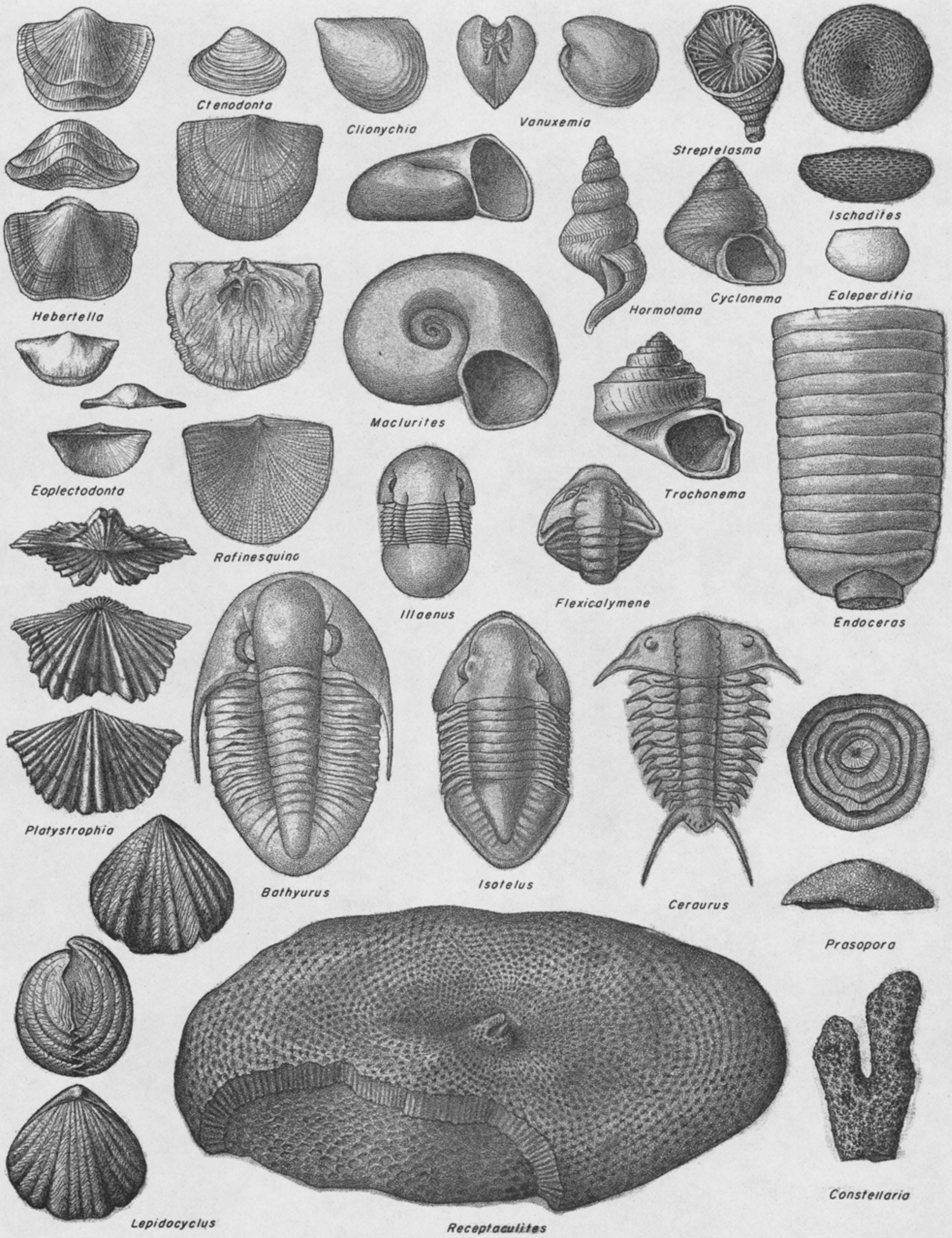


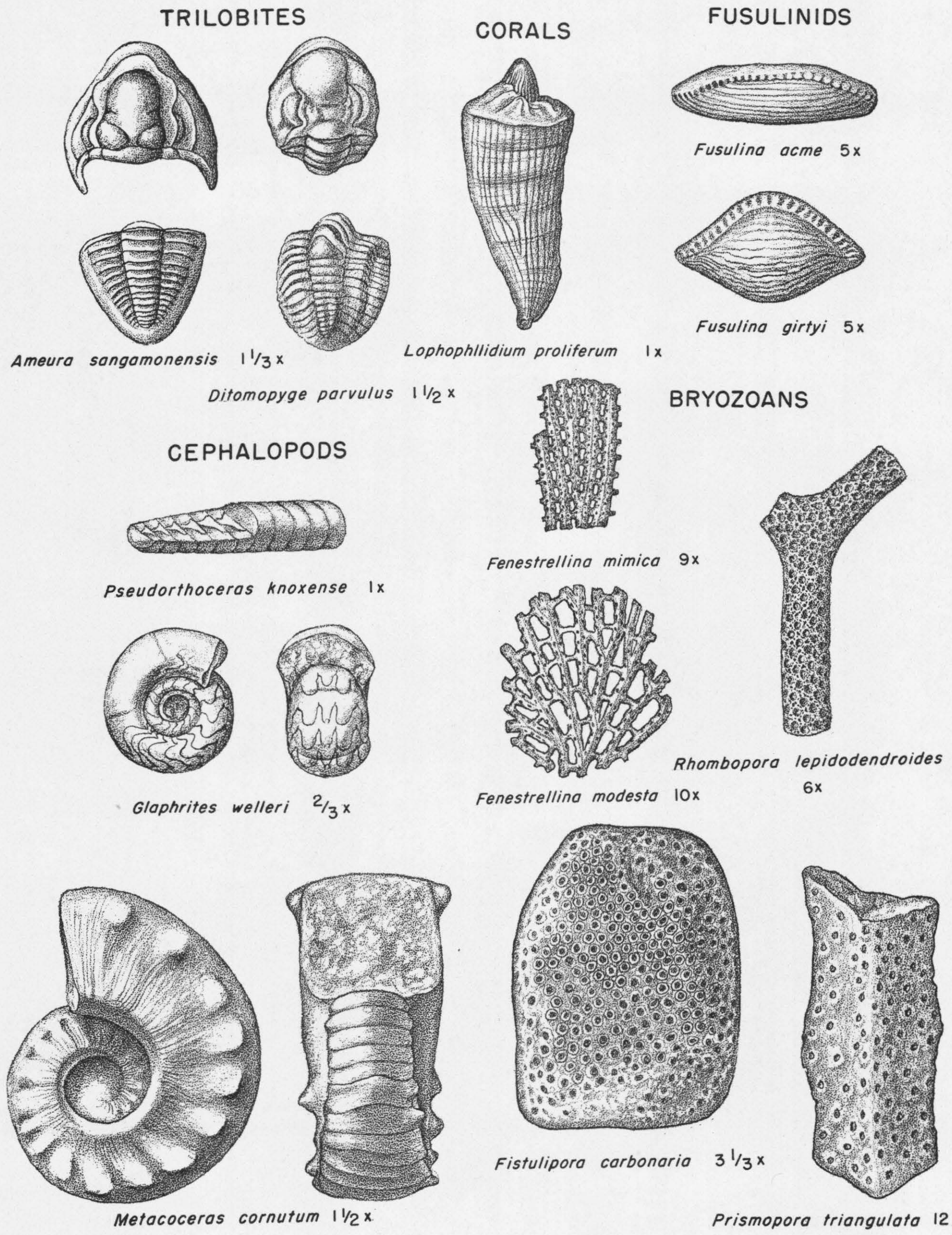
GLACIAL MAP OF NORTHEASTERN ILLINOIS

George Ekblaw

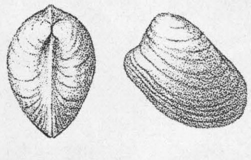
Revised 1960

ORDOVICIAN FOSSILS

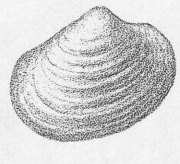



TRILOBITES
CORALS
FUSULINIDS
Fusulina acme 5x
Fusulina girtyi 5x
Ameura sangamonensis 1 1/3 x
Lophophllidium proliferum 1x
Ditomopyge parvulus 1 1/2 x
BRYOZOANS
CEPHALOPODS
Pseudorthoceras knoxense 1x
Fenestrellina mimica 9x
Glaphrites welleri 2/3 x
Fenestrellina modesta 10x
Rhombopora lepidodendroides 6x
Fistulipora carbonaria 3 1/3 x
Metacoceras cornutum 1 1/2 x
Prismopora triangulata 12x

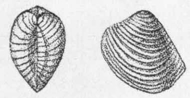
PELECYPODS



Nucula (Nuculopsis) girtyi 1x

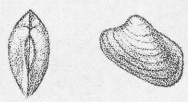


Edmonia ovata 2x

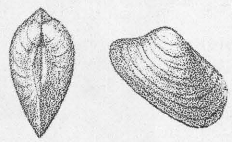


Astartella concentrica 1x

Dunbarella knighti 1½x

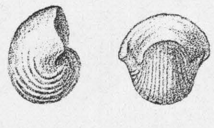


Cardiomorpha missouriensis "Type A" 1x

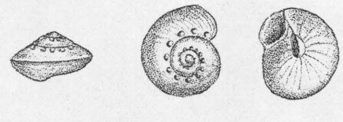


Cardiomorpha missouriensis "Type B" 1½x

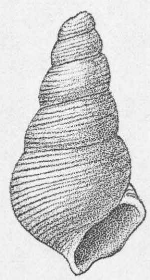
GASTROPODS



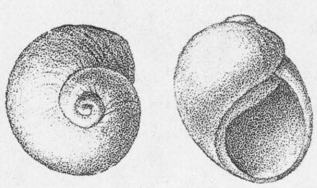
Euphemites carbonarius 1½x



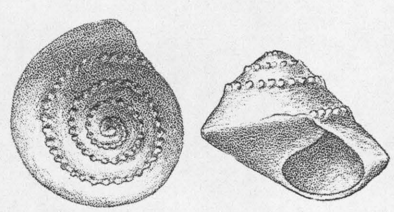
Trepospira illinoisensis 1½x



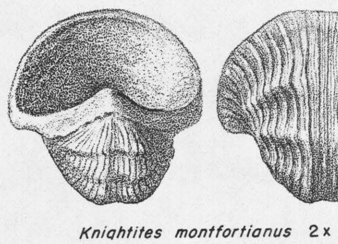
Donaldina robusta 8x



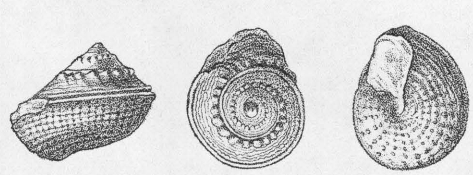
Naticopsis (Jedria) ventricosa 1½x



Trepospira sphaerulata 1x

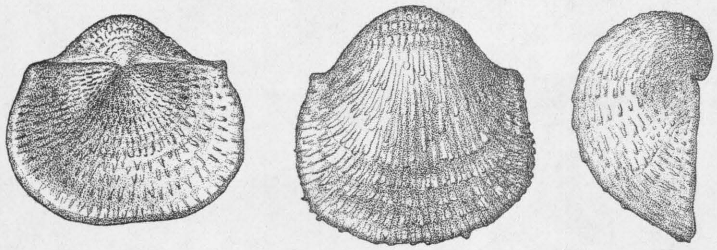


Knightites montfortianus 2x

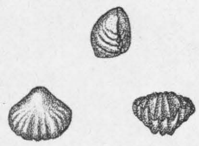


Glabrocingulum (Glabrocingulum) grayvillense 3x

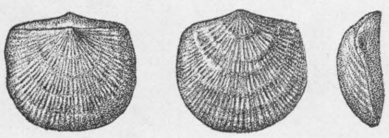
BRACHIOPODS



Juresania nebrascensis 2/3 x

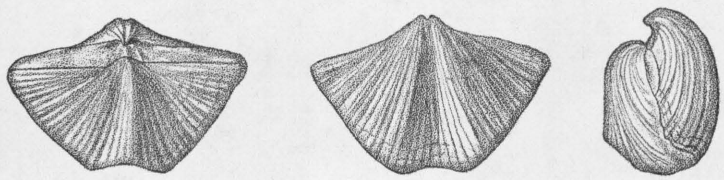


Wellerella tetrahedra 1 1/2 x

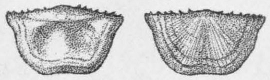


Derbya crassa 1x

Composita argentia 1x

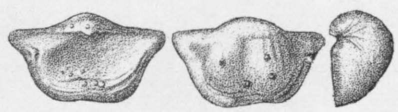


Neospirifer cameratus 1x

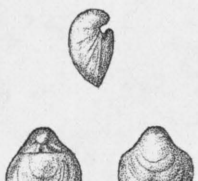


Chonetes granulifer 1 1/2 x

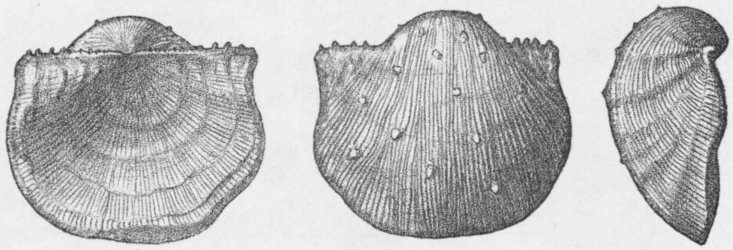
Mesolobus mesolobus var. *evampygus* 2x



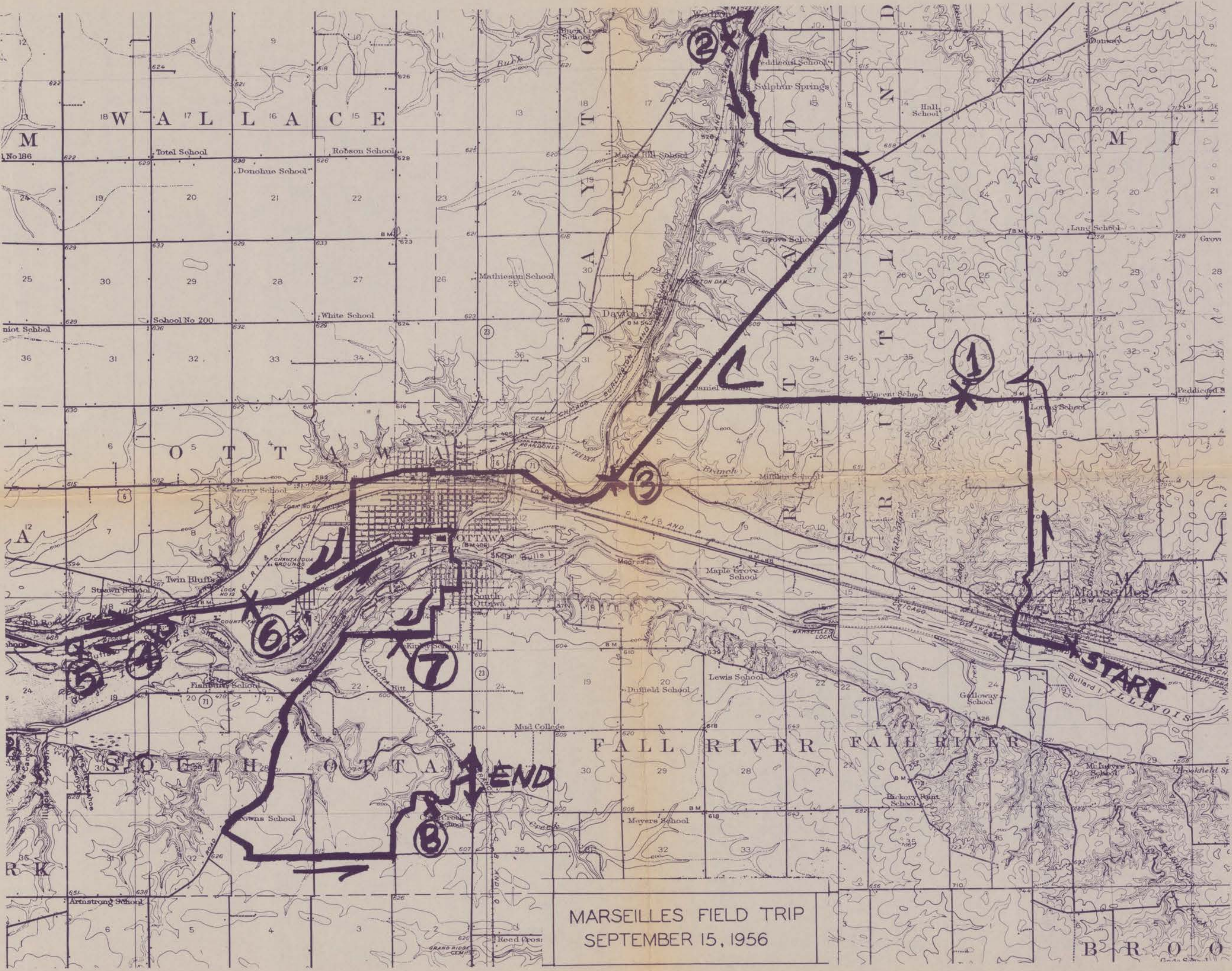
Marginifera splendens 1x



Crurithyris planoconvexa 2x



Linoproductus "cora" 1x



MARSEILLES FIELD TRIP
SEPTEMBER 15, 1956